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10/593,021	08/04/2008	Reiner Schmitt	10191/4758	5723

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EXAMINER	
DINH, BACH T	

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03/30/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/593,021	SCHMITT ET AL.	
	Examiner	Art Unit	
	BACH T. DINH	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 August 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *28-54* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *28-54* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 August 2008* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *09/14/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Summary

1. This is the initial Office Action based on the 10/593,021 application filed on 08/04/2008.

2. Claims 28-54 are currently pending and have been fully considered.

Priority

3. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 37 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Current claim recites the ratio of $b/c \leq 0.8$; however, according to figure 5 of current application, the width b cannot be smaller than the sum of the widths of individual conductor track c because the width b is the sum of the width of the individual conductor tracks as well as the width of the recesses; therefore, it is unclear how the ratio of b/c is less than 1 when b cannot be smaller than c. For the purpose of examination, claim 37 is read in light of figure 5 of the originally filed specification where b/c is greater than 1.

6. Claim 50 recites the limitation "the ceramic portion" on line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 28-31, 38-40, 42 and 52-54 are rejected under 35 U.S.C. 102(b) as being anticipated by Scheer et al. (US 2003/0019279).

Addressing claims 28-30, Scheer discloses a sensor element (figures 1-3) for detecting a gas component in a measuring gas, comprising:

A solid electrolyte 14;

A conductor track 16 applied to the solid electrolyte, wherein the conductor track includes an electrode 16 situated in a measuring area of the sensor element and an electrode lead 16' connected to the electrode and situated in a lead area of the sensor element, and wherein the conductor track has a narrowing in a transition area between the measuring area and the lead area (please see inserted figure 3 below, the portion between the two solid lines is the claimed narrowing); and

A heater element 4 for heating the measuring area of the sensor element.

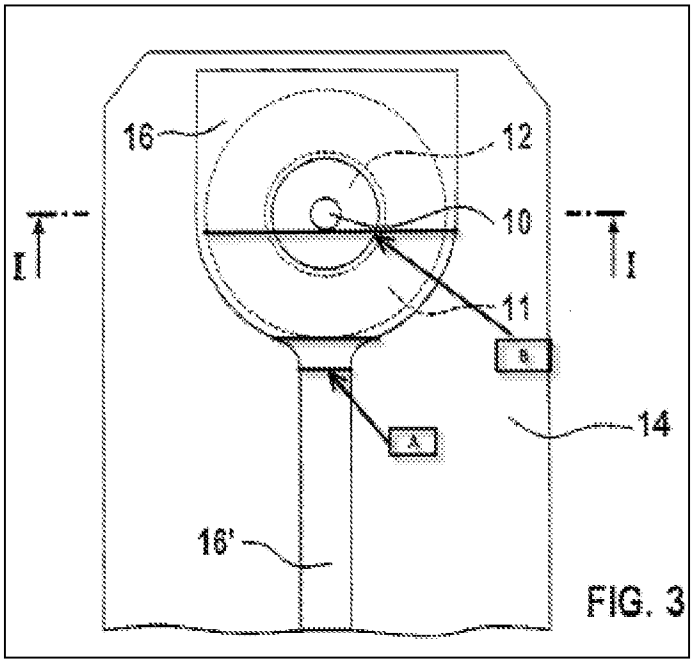


FIG. 3

With regard to claim 29, the conductor track is formed as one layer; therefore, the thickness of uniform. Thus, the cross-sectional area is determined by the width of the conductor track, in the figure above, the width of the area of the narrowing is smaller than the width of the electrode area; therefore, the cross sectional area of the area of the narrowing is smaller than the width of the electrode area. Furthermore, a smaller cross-sectional area also reduces the heat conduction along the conductor track from the measuring area to the lead area as required by claim 30.

With regard to claims 31 and 38-39, in the inserted figure 3 above, the width along line A is less than 70% of the width at line B; therefore, the cross sectional area at line A is also less than 70% of the cross sectional area at line B.

Addressing claim 40, in figure 1, 14 is the first solid electrolyte sheet and 7 is the second solid electrolyte sheet with the conductor track 15, which has the same shape as conductor track 16 [0053], situated in a layer plane between the two solid electrolyte sheets.

Addressing claim 42, Scheer discloses the sensor element further comprising:

A first electrochemical cell including a first electrode 16, a second electrode 15, and a solid electrolyte sheet 14, a measuring gas space 11, a gas inlet opening 10 and a diffusion barrier 12; and

A second electrochemical cell including a third electrode 13 and a fourth electrode 8 connected via a solid electrolyte 7, a reference gas chamber 6, and wherein the narrowing of the conductor track encompasses the third electrode 13 and the third lead (figure 1, [0060], the third electrode has the same shape as electrodes 15 and 16).

Addressing claims 52 and 54, in inserted figure 3 below, the portion of electrode 16 above the line C is the second electrode section that is electrically connected to the first electrode section (section below the line C, between the above indicated transition area and the second electrode section), which is connected to the electrode lead 16' in the transition area between the measuring are and the lead area, only on their sides facing away from the lead area.

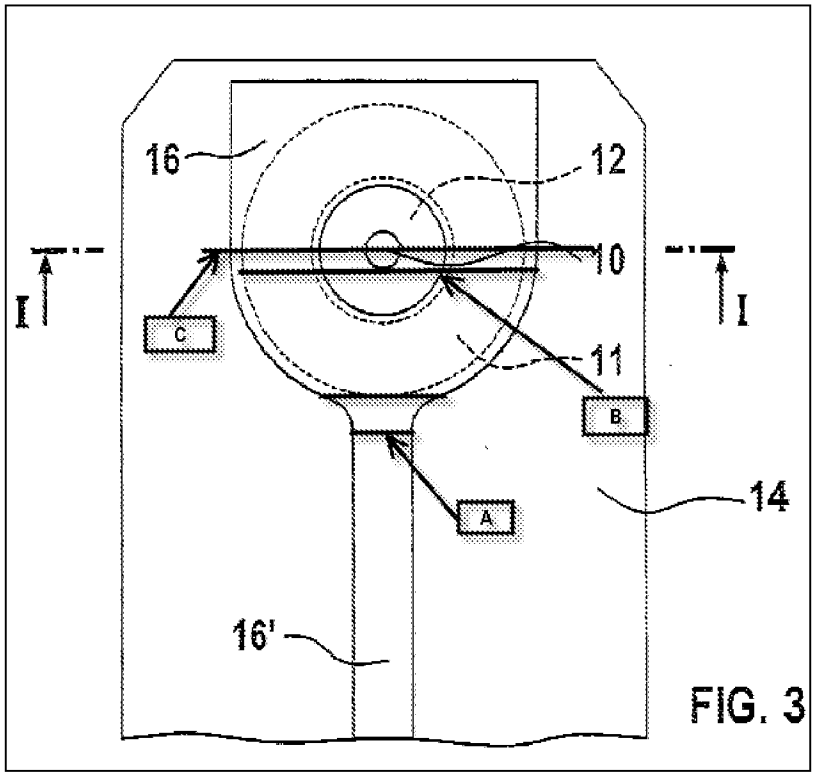


FIG. 3

In the alternative, the electrode of the conductor track 8 also includes a first electrode section connected to the electrode lead 8' in a transition area between the measuring area and the lead area and a second electrode section that is connected to the first electrode section only on their sides facing away from the lead area as indicated below.

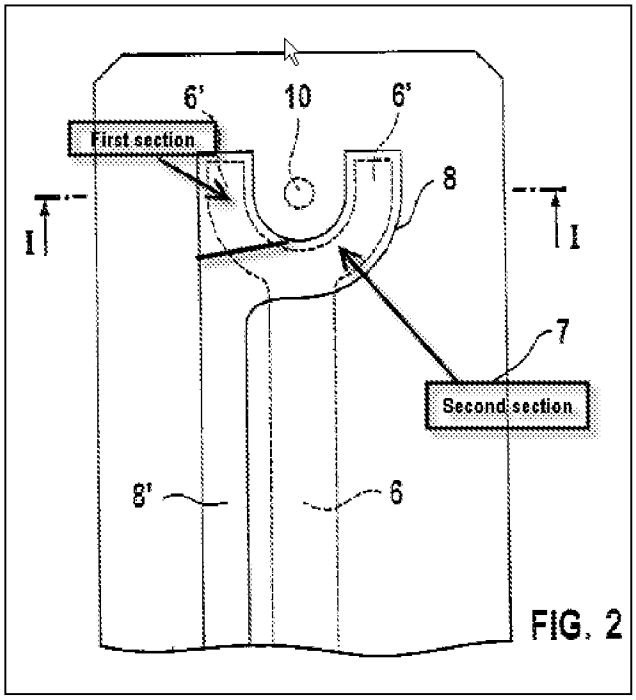


FIG. 2

Addressing claim 53, in the figure 2 above, the second electrode section has an annular shape, and a side of the second electrode section facing the lead area has a recess in which the first electrode section is situated (from the inserted figure 2 above, the space between the two sides of the second electrode section where first section resides is the claimed recess).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. The factual inquiries set forth in Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. Claims 28-31 and 38-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Diehl (US 2002/0017462) in view of Suzuki (US 2004/0040847).

Addressing claims 28-30, Diehl discloses a gas sensor element for detecting a gas component in a measuring gas, comprising:

A solid electrolyte 11;

A conductor track (22+15) applied to the solid electrolyte, wherein the conductor track includes an electrode 22 situated in a measuring area of the sensor element and an electrode lead 15 connected to the electrode and situated in the lead area, and wherein the conductor track has a narrowing in a transition area between the measuring area and the lead area (please see figures 1-3).

Diehl is silent regarding a heater element for heating the measuring area of the sensor element.

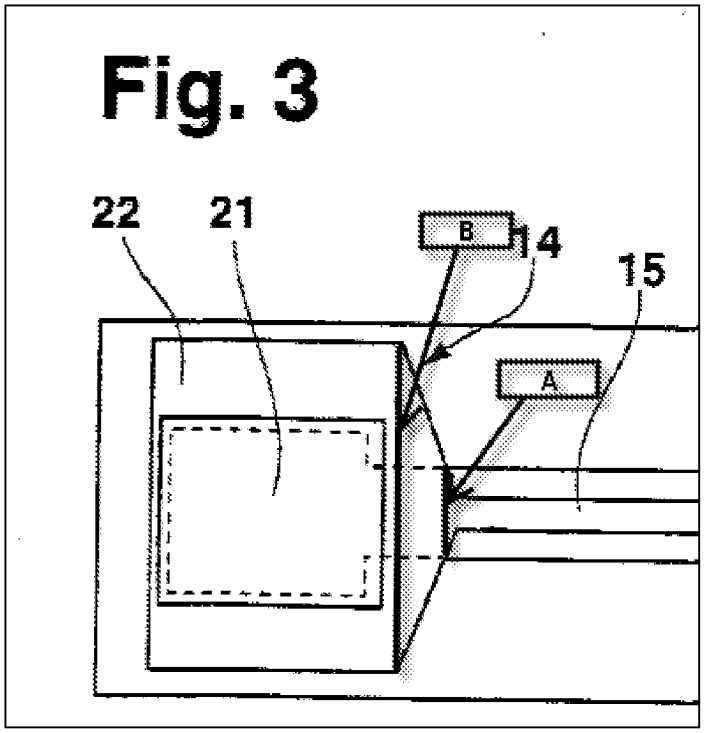
Suzuki discloses a gas sensor comprises a heater element 19 (figure 1).

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the gas sensor of Diehl with the heater element of Suzuki because the

heater element heats the gas sensor, including the measuring area, to its activation temperatures (Suzuki, [0110]).

With respect to the limitation of claim 29, since the portions 22 and 15 are applied as one conductive layer; therefore, the conductive layer must have uniform thickness. Thus, the cross sectional area is determined by the width of the conductive layer. In figures 1 and 3, the width of the narrowing is smaller than the first area 22 of the conductor track adjacent to the narrowing; therefore, the cross-sectional area of the area of narrowing is smaller than the cross-sectional area of the portion 22. Furthermore, a smaller cross-sectional area also reduces the heat conduction along the conductor track from the measuring area to the lead area as required by claim 30.

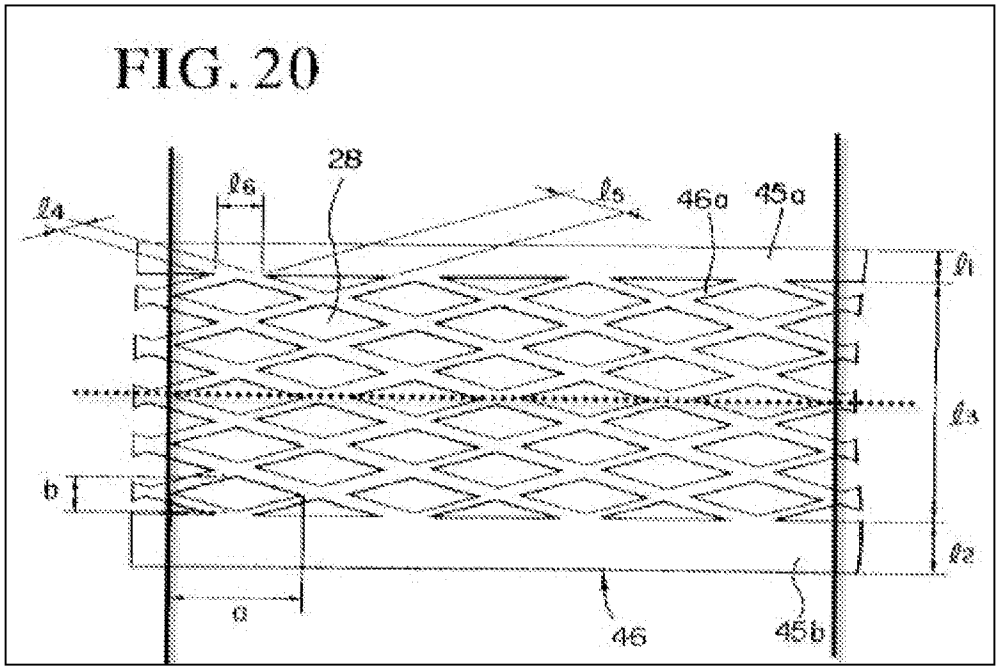
Addressing claims 31 and 38-39, in the inserted figure 3 below, the cross sectional area along line A of the narrowing is less than 70% of the cross sectional area along line B of the first area of the conductor track adjacent to the narrowing.



12. Claims 32-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Diehl (US 2002/0017462) in view of Suzuki (US 2004/0040847) as applied to claims 28-31 above, and further in view of Toyao et al. (US 5,436,216).

Addressing claim 32, Diehl is silent regarding the claimed ratio.

Toyao discloses a honeycomb filter for catalytic converter of an automobile comprises conductive plate 46 (figures 19-20, 5:46-53) having areas 45a and 45b with a narrowing portion therebetween (figure 20 reproduced below). Furthermore, the narrowing portion comprises a plurality of slits 46a and the disclosed dimensions in col. 12 lines 12-34.



From the picture above, the width of the conductor track 46 between the two solid lines is $b = 4a+3l_6$ and the cross sectional area of the conductor track along the dotted line is $A = 3(l_6*\text{thickness})$. Furthermore, the thickness of the conductor track 46 is 0.03-0.05 mm (12:30-34). The parameter a is calculated based on the fact that the slit 46a is a rhombus with the parameter b = 0.4 mm and l_5=45 mm; therefore, a = 90 mm. From the calculation above, the width $b = 4a+3l_6$ = 375 mm and the cross section area is $A=3(l_6*0.05\text{mm}) = 0.75\ \text{mm}^2$; therefore, the ratio A/b is .75/375 or 0.002 mm.

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the narrowing portion of the conductor track of Diehl with the slits of the conductor track disclosed by Toyao because the slits reduces power consumption in raising the temperature of the conductor track as well as reduce the heat conduction between the areas 45a and 45b (Toyao, 2:23-54). Therefore, in the modified gas sensor

of Diehl, the slits provided in the narrowing reduce the heat conduction between the electrode and the lead.

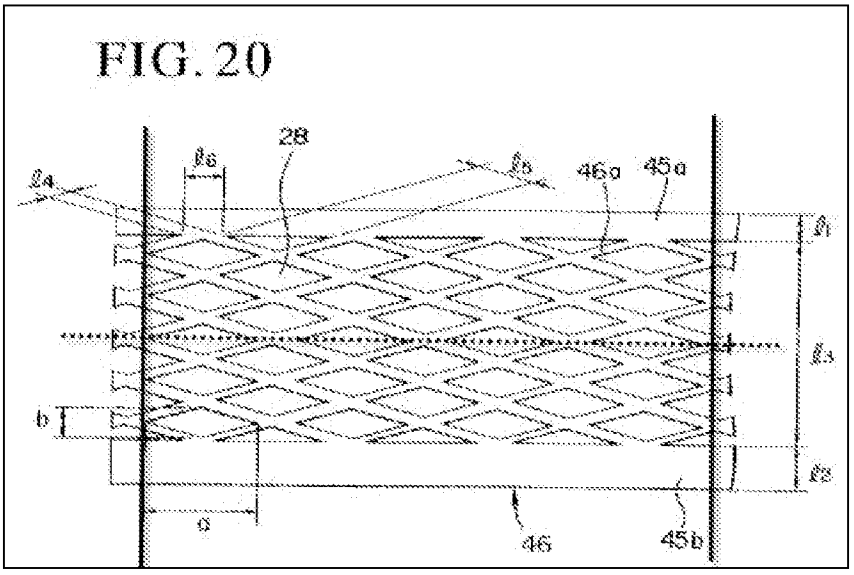
Addressing claims 33-36, the slits 46a of Toyao (figure 20) are the claimed slot-shaped recesses having the shorter side (b) and the longer side (a) that is perpendicular to the longitudinal extension of the conductor track and approximately perpendicular to the heat gradient formed in the conductor track because the heat gradient is along the direction from 45a-45b.

Addressing claim 37, in figure 20 above, the width of the conductor track between the two solid lines is clearly greater than the sum of the width of the individual conductor track sections separated by the recesses; therefore, in light of the indefinite rejection above, the ratio of b/c is greater than 1 just like that shown in figure 5 of current application.

13. Claims 32-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Scheer et al. (US 2003/0019279) in view of Toyao et al. (US 5,436,216).

Addressing claim 32, Scheer is silent regarding the claimed ratio.

Toyao discloses a honeycomb filter for catalytic converter of an automobile comprises conductive plate 46 (figures 19-20, 5:46-53) having areas 45a and 45b with a narrowing portion therebetween (figure 20 reproduced below). Furthermore, the narrowing portion comprises a plurality of slits 46a and the disclosed dimensions in col. 12 lines 12-34.



From the picture above, the width of the conductor track 46 between the two solid lines is $b = 4a+3l_6$ and the cross sectional area of the conductor track along the dotted line is $A = 3(l_6*\text{thickness})$. Furthermore, the thickness of the conductor track 46 is 0.03-0.05 mm (12:30-34). The parameter a is calculated based on the fact that the slit 46a is a rhombus with the parameter b = 0.4 mm and l_5=45 mm; therefore, a = 90 mm. From the calculation above, the width $b = 4a+3l_6 = 375$ mm and the cross section area is $A=3(l_6*0.05\text{mm}) = 0.75\ \text{mm}^2$; therefore, the ratio A/b is .75/375 or 0.002 mm.

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the narrowing portion of the conductor track of Scheer with the slits of the conductor track disclosed by Toyao because the slits reduces power consumption in raising the temperature of the conductor track as well as reduce the heat conduction between the areas 45a and 45b (Toyao, 2:23-54). Therefore, in the modified gas sensor of Scheer, the slits provided in the narrowing reduce the heat conduction between the electrode and the lead.

Addressing claims 33-36, the slits 46a of Toyao (figure 20) are the claimed slot-shaped recesses having the shorter side (b) and the longer side (a) that is perpendicular to the longitudinal extension of the conductor track and approximately perpendicular to the heat gradient formed in the conductor track because the heat gradient is along the direction from 45a-45b.

Addressing claim 37, in figure 20 above, the width of the conductor track between the two solid lines is clearly greater than the sum of the width of the individual conductor track sections separated by the recesses; therefore, in light of the indefinite rejection above, the ratio of b/c is greater than 1 just like that shown in figure 5 of current application.

14. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Scheer et al. (US 2003/0019279) in view of Jain et al. (US 2003/0230484).

Addressing claim 41, Scheer is silent regarding the height or the thickness of the conductor track.

Jain discloses a gas sensor; wherein, the electrode thickness dictates the electrode's durability and sensor sensitivity [0030] and the thickness of the electrode is preferably between 3 to 7 microns [0031].

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the gas sensor of Scheer with the electrode thickness as disclosed by

Jain because the disclosed thickness produce a balance between durability and sensitivity (Jain, [0030]). Furthermore, one with ordinary skill in the art would have arrived at the claimed thickness when performing routine experimentations with the thickness of Scheer's electrodes in order to optimize the durability and the sensitivity of the electrode (Jain, [0030]).

15. Claims 43-44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Scheer et al. (US 2003/0019279) in view of Scheer et al. (WO 03/036281) with equivalent English translation provided by Scheer et al. (US 7,445,699 or '699).

Addressing claim 43, Scheer is silent regarding the narrowing of the conductor track is situated between the fourth electrode and the heater element, and the fourth electrode is at least one of electrically insulated and electrically shielded from the heater element by the area of the conductor track that includes the narrowing.

Scheer '699 discloses a gas sensor; wherein, the reference electrode is disposed in the same plane of stratification as the measuring area (figure 1); furthermore, the reference chamber is also filled with porous material 32. Additionally, the electrode lead of the electrode is covered by an electrically insulating layer to insulate the electrode lead from the solid electrolyte (3:35-49).

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the gas sensor of Scheer with the electrically insulating layer covering the electrode lead and providing the reference gas chamber and the fourth electrode on the same plane of stratification as the measuring area in the manner disclosed by Scheer

'699 because the insulating layer would electrically insulate and protect the electrode lead and the gas reference chamber provided in the same plane of stratification as the measuring area reduces the in-coupling of the first electrode and the third electrode and thus the lambda value ripple (Scheer '699, 3:35-4:5). In the modified gas sensor of Scheer, the narrowing portion of the conductor track 13 is between the fourth electrode 8 that is provided in the reference gas chamber that is in the same plane of stratification as the measuring area. Furthermore, the insulating layer of the lead for the electrode 13 would electrically insulate and shield the fourth electrode 8 from the heater element.

Addressing claim 44, please see the inserted figure 3 below.

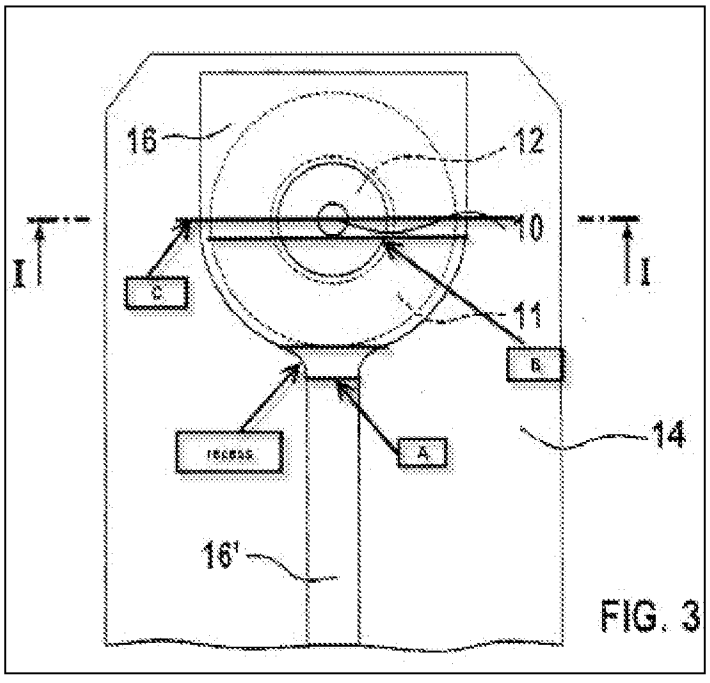


FIG. 3

16. Claims 45-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Scheer et al. (US 2003/0019279) in view of Saguchi et al. (US 2004/0140212).

Addressing claims 45-46, Scheer is silent regarding the conductor track includes a strip in the area of the narrowing and the width of the strip is at least 0.5 mm.

Saguchi discloses a gas sensor comprises a narrow portion in the form of a strip having the width W1 or W2 of 1.5 mm (figures 2 and 5, [0081]) connecting the electrode and the lead.

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the gas sensor of Scheer with the strip in the narrowing portion connecting the electrode and the lead because using the known strip element of Saguchi in the gas sensor of Scheer to obtain the predictable result of connecting the electrode and the lead is a matter of obviousness (rationale A, KSR decision, MPEP 2141).

17. Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over Scheer et al. (US 2003/0019279) in view of Harada et al. (US 4,915,814).

Addressing claim 47, Scheer is silent regarding a gas diffusion-inhibiting section substantially prevents a gas exchange between the electrode of the conductor track and the lead of the conductor track.

Harada discloses a gas sensor; wherein, the lead of the electrode is covered with a dense layer to completely shield the lead from gas (6:61-64).

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the gas sensor of Scheer with the dense insulating layer covering the lead of the conductive track because the dense layer would shield the lead from reaction

with the exhaust gas (Harada, 6:61-64); thus, the dense layer would also prevent the gas exchange between the electrode and the lead.

18. Claims 48-49 and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Scheer et al. (US 2003/0019279) in view of Harada et al. (US 4,915,814) as applied to claim 47 above, and further in view of Kato et al. (US 2001/0008211) and Kunimoto et al. (US 2002/0017461).

Addressing claims 48-49 and 51, Scheer and Harada are silent regarding the porosity of the diffusion-inhibiting section and the porosity of the electrode.

Kato discloses a gas sensor comprises densified insulating layers for covering the leads (Abstract); wherein, densified is defined as having the porosity of not more than 10% [0029].

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the porosity of the dense layer of Scheer to have the porosity of 10% or less because said porosity ensure that the measuring would not reach the lead to carry out unwanted reactions (Kato, [0026]). Furthermore, one with ordinary skill in the art would have arrived at the claimed porosity range for the diffusion-inhibiting section when perform routine experiments with the diffusion-inhibiting section in order to optimize the ability of the diffusion-inhibiting section to prevent the measuring gas from reaching the electrode lead. Furthermore, the porosity of less than 10% is considered as closed porosity.

Kunimoto discloses a gas sensor comprises electrode having porosity of 10 to 50% by volume [0064].

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the electrode of Scheer to have the porosity as disclosed by Kunimoto because the electrode with said porosity would produce good response property and raise the oxidation removal efficiency (Kunimoto, [0064]). Furthermore, the porosity of 10 to 50% is considered as open porosity.

19. Claim 50 is rejected under 35 U.S.C. 103(a) as being u Scheer et al. (US 2003/0019279) in view of Harada et al. (US 4,915,814) as applied to claim 47 above, and further in view of Kato et al. (US 2001/0008211) and Kunimoto et al. (US 2002/0108856).

Addressing claim 50, Scheer and Harada are silent regarding the conductor track includes a metallic portion and a ceramic portion and wherein the ceramic portion of the diffusion-inhibiting section of the conductor track is smaller than the ceramic portion of the electrode and the required percent by volume ranges.

Kato discloses lead wires for the electrode comprises 40% by volume of ZrO_2 [0107].

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the conductor track of Scheer with 40% by volume of ZrO_2 as disclosed by Kato because the inclusion of said amount of ZrO_2 prevent the invasion of unnecessary oxygen from the outside through the lead wire; thereby, increasing the accuracy of current sensor (Kato, [0026]).

Kunimoto discloses the inclusion of zirconia or alumina increase the porosity of a layer [0076].

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the ceramic portion of the diffusion inhibiting section of Scheer and Harada to have small concentration of zirconia because decreasing the concentration of zirconia would decrease the porosity (Kunimoto, [0076]); thereby, allowing the diffusion inhibiting section to be more effective at shielding the lead from reaction with the exhaust gas (Harada, 6:61-64). Thus, one would have arrived at the claimed ceramic portion range of 10 to 40 percent by volume for the diffusion inhibiting layer by performing routine experimentation in order to optimize the porosity and the ability for the diffusion inhibiting layer to shield the lead from reaction with the exhaust gas.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BACH T. DINH whose telephone number is (571)270-5118. The examiner can normally be reached on Monday-Friday EST 7:00 A.M-3:30 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on (571)272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nam X Nguyen/
Supervisory Patent Examiner, Art Unit 1753

BD
03/23/2011